

IN THE CLAIMS

Please amend the claims as follows:

Claims 1-17 (Canceled).

Claim 18 (Currently Amended): A radio communication apparatus at a transmission side that includes a plurality of transmission antennas and performs a communication using at least one carrier, the radio communication apparatus comprising:

a channel dividing unit configured to divide that divides a transmission signal into a plurality of channels based on channel structure information returned from another radio communication apparatus at a reception side and indicating a structure of a space-division-multiplexing method of structuring a multiple input multiple output channel and a space-time-coding channel between transmission and reception antennas informed from a communication apparatus at a reception side; and

a space-time-coding unit configured to realize that realizes transmission diversity by performing a space-time-coding processing for each of the plurality of channels divided.

Claim 19 (Currently Amended): The radio communication apparatus according to claim 18, further comprising:

a beam forming unit configured to perform that performs an individual direction control by a complex multiplication with respect to each of the plurality of channels to which the space-time-coding processing is performed, and to distribute distributes the plurality of channels to for each of the plurality of transmission antennas; and

an adding unit configured to add that adds all of the transmission signals to which the direction control is performed corresponding to each of the plurality of transmission antennas.

Claim 20 (Currently Amended): A radio communication apparatus at a reception side that includes at least one reception antenna and performs a communication using at least one carrier, the radio communication apparatus comprising:

a channel estimating unit configured to estimate that estimates a channel gain between a transmission side and the reception side; and

a channel-structure determining unit configured to determine that determines a structure of a multiple-input-multiple-output channel based on a result of the estimation of the channel gain, a physical configuration of an other radio communication apparatus at the transmission side, and a physical configuration of the radio communication apparatus, and to return informs channel structure information indicating a structure of a space-division-multiplexing channel and a space-time-coding channel between transmission and reception antennas that is a result of the determination to the other radio communication apparatus at the transmission side.

Claim 21 (Currently Amended): The radio communication apparatus according to claim 20, wherein the channel-structure determining unit is further configured to generate generates the channel structure information based on at least one of the result of the estimation of the channel gain, a number of antennas of the other radio communication apparatus at the transmission side and of the radio communication apparatus, and a

computational capability of the other radio communication apparatus at the transmission side and of the radio communication apparatus.

Claim 22 (Currently Amended): The radio communication apparatus according to claim 21, further comprising a coherent bandwidth measuring unit configured to measure that measures a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit is further configured to divide ~~divides~~ a signal band into a plurality of subcarrier groups having the same channel information based on a result of measurement of the coherent bandwidth, and to perform ~~performs~~ the estimation of the channel gain per ~~in~~ units of a subcarrier group.

Claim 23 (Currently Amended): The radio communication apparatus according to claim 22, wherein the channel estimating unit is further configured to perform ~~performs~~ the estimation of the channel gain for a plurality of subcarriers within the ~~each~~ subcarrier group, and to average ~~averages~~ results of the estimation of the channel gain for the plurality of subcarriers.

Claim 24 (Currently Amended): A radio communication apparatus that includes a plurality of transmission antennas and at least one reception antenna, and performs a communication using at least one carrier, the radio communication apparatus comprising:  
a transmission-processing unit including ~~comprising~~:

a channel dividing unit configured to dividethat divides a transmission signal into a plurality of channels based on channel structure information returned from a first radio communication apparatus at a reception side and indicating a structure of a space-division-multiplexingmethod of structuring a multiple input multiple output channel informedand a space-time-coding channel between transmission and reception antennasfrom a communication apparatus at a reception side;, and

a space-time-coding unit configured to realizethat realizes transmission diversity by performing a space-time-coding processing for each of the plurality of channels divided; and

a reception-processing unit includingeomprising:

a channel estimating unit configured to estimatethat estimates a channel gain between a transmission side and a reception side[[;]], and

a channel-structure determining unit configured to determinethat determines a structure of a multiple-input-multiple-output channel based on a result of the estimation of the channel gain, a physical configuration of a second radio communication apparatus at the transmission side, and a physical configuration of the first radio[[a]] communication apparatus at the reception side, and to returninforms channel structure information that is a result of the determination to the second radio communication apparatus at the transmission side.

Claim 25 (Currently Amended): The radio communication apparatus according to claim 24, wherein the channel-structure determining unit is further configured to generategenerates the channel structure information based on at least one of the result of the

estimation of the channel gain, a number of antennas of the second radio communication apparatus at the transmission side and of the first radio communication apparatus at the reception side, and a computational capability of the second radio communication apparatus at the transmission side and the first radio communication apparatus at the reception side.

Claim 26 (Currently Amended): The radio communication apparatus according to claim 25, wherein

the reception-processing unit further includes a coherent bandwidth measuring unit configured to measure that measures a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit is further configured to divide divides a signal band into a plurality of subcarrier groups having the same channel information based on a result of measurement of the coherent bandwidth, and to perform performs the estimation of the channel gain per in units of a subcarrier group.

Claim 27 (Currently Amended): The radio communication apparatus according to claim 26, wherein the channel estimating unit is further configured to perform performs the estimation of the channel gain for a plurality of subcarriers within each the subcarrier group, and to average averages results of the estimation of the channel gain for the plurality of subcarriers.

Claim 28 (Currently Amended): A transmitter that includes a plurality of transmission antennas and transmits a transmission signal to a receiver using at least one carrier, the transmitter comprising:

a channel dividing unit configured to dividethat divides a transmission signal into a plurality of channels based on channel structure information returned from the receiver and indicating a structure of a space-division-multiplexingmethod of structuring a multiple input-multiple output channel informedand a space-time-coding channel between transmission and reception antennasfrom the receiver; and

a space-time-coding unit configured to realizethat realizes transmission diversity by performing a space-time-coding processing for each of the plurality of channels divided.

Claim 29 (Currently Amended): The transmitter according to claim 28, further comprising:

a beam forming unit configured to performthat performs an individual direction control by a complex multiplication with respect to each of the plurality of channels to which the space-time-coding processing is performed, and to distributedistributes the plurality of channels tofor each of the plurality of transmission antennas; and

an adding unit configured to addthat adds all of the transmission signals to which the direction control is performed corresponding to each of the plurality of transmission antennas.

Claim 30 (Currently Amended): A receiver that includes at least one reception antenna and receives a signal from a transmitter using at least one carrier, the receiver comprising:

a channel estimating unit configured to estimate that estimates a channel gain between a transmission side and a reception side; and

a channel-structure determining unit configured to determine that determines a structure of a multiple-input-multiple-output channel based on a result of the estimation of the channel gain, a physical configuration of the transmitter, and a physical configuration of the receiver, and to return informs channel structure information indicating a structure of a space-division-multiplexing channel and a space-time-coding channel between transmission and reception antennas that is a result of the determination to the transmitter.

Claim 31 (Currently Amended): The receiver according to claim 30, wherein the channel-structure determining unit is further configured to generate generates the channel structure information based on at least one of the result of the estimation of the channel gain, a number of antennas of the transmitter and of the receiver, and a computational capability of the transmitter and of the receiver.

Claim 32 (Currently Amended): The receiver according to claim 31, further comprising a coherent bandwidth ~~the coherent band width~~ measuring unit configured to measure ~~that measures~~ a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit is further configured to divide~~divides~~ a signal band into a plurality of subcarrier groups having the same channel information based on a result of measurement of the coherent bandwidth, and to perform~~performs~~ the estimation of the channel gain per~~in~~ units of a subcarrier group.

Claim 33 (Currently Amended): The receiver according to claim 32, wherein the channel estimating unit is further configured to perform~~performs~~ the estimation of the channel gain for a plurality of subcarriers within each~~the~~ subcarrier group, and to~~average~~averages results of the estimation of the channel gain for the plurality of subcarriers.

Claim 34 (Currently Amended): A radio communication system comprising:  
a transmitter configured to transmit~~that transmits~~ a transmission signal to a receiver using at least one carrier, the transmitter including~~comprising~~:  
a plurality of transmission antennas[[;]],  
a channel dividing unit configured to divide~~that divides~~ a transmission signal into a plurality of channels based on channel structure information returned from the receiver and indicating a structure of a space-division-multiplexing~~method of structuring a multiple input multiple output channel informed and a space-time-coding channel between transmission and reception antennas from the receiver;~~ and  
a space-time-coding unit configured to realize~~that realizes~~ transmission diversity by performing a space-time-coding processing for each of the plurality of channels~~divided~~; and

a receiver configured to receive that receives the transmission signal from the transmitter using at least one carrier, including comprising:

at least one reception antenna[[:]],

a channel estimating unit configured to estimate that estimates a channel gain between a transmission side and a reception side[[:]], and

a channel-structure determining unit configured to determine that determines a structure of a multiple-input-multiple-output channel based on a result of the estimation of the channel gain, a physical configuration of the transmitter, and a physical configuration of the receiver, and to return informs channel structure information that is a result of the determination to the transmitter.

Claim 35 (Currently Amended): The radio communication system according to claim 34, wherein the channel-structure determining unit is further configured to generate generates the channel structure information based on at least one of the result of the estimation of the channel gain, a number of antennas of the transmitter and of the receiver, and a computational capability of the transmitter and of the receiver.

Claim 36 (Currently Amended): The radio communication system according to claim 35, wherein

the receiver further includes a coherent bandwidth measuring unit configured to measure that measures a coherent bandwidth at a channel by observing a reception signal, wherein

the channel estimating unit is further configured to divide~~divides~~ a signal band into a plurality of subcarrier groups having the same channel information based on a result of measurement of the coherent bandwidth, and to perform~~performs~~ the estimation of the channel gain ~~per~~in units of a subcarrier group.

Claim 37 (Currently Amended): The radio communication system according to claim 36, wherein the channel estimating unit is futher configured to perform~~performs~~ the estimation of the channel gain for a plurality of subcarriers within ~~the~~each subcarrier group, and to average~~averages~~ results of the estimation of the channel gain for the plurality of subcarriers.

Claim 38 (New): The radio communication apparatus according to claim 18, wherein the radio communication apparatus is configured to simultaneously use the space-division-multiplexing channel and the space-time-coding channel in the communication.

Claim 39 (New): The radio communication apparatus according to claim 24, wherein the transmission-processing unit is configured to simultaneously use the space-division-multiplexing channel and the space-time-coding channel in the communication.

Claim 40 (New): The transmitter according to claim 28, wherein the transmitter is configured to simultaneously use the space-division-multiplexing channel and the space-time-coding channel.

Claim 41 (New): The radio communication system of claim 34, wherein the transmitter is further configured to simultaneously use the space-division-multiplexing channel and the space-time-coding channel.